OBSERVATIONS ON A NOTEWORTHY WILD LIMA BEAN, *Phaseolus lunatus* L., FROM COLOMBIA

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As it has been shown for the common bean (1,2), it seems that on the basis of biochemical evidences (3,4) there are two major genepools for the lima bean, *Phaseolus lunatus* L., one tentatively called Mesoamerican and the other Andean. These two genepools would correspond to separate domestication events, independent in time and space, with perhaps earlier dates for the domestication of the Andean genepool (5).

In contrast with wild common bean where morphological differences between populations along the range are small although real (6), there are marked morphological differences between the two groups of wild lima bean (7), especially in seed and flower characteristics, and thus a 'Mesoamerican' and an 'Andean' morphotypes could be distinguished. While the wild form of the Andean genepool has a restricted range (so far from the Imbabura province in Ecuador down to the Cajamarca province in northern Peru, in interandean valleys on the western slopes of the Andes), the wild form of the so-called Mesoamerican genepool is widely distributed in the lowlands of the Neotropics. Its range extends from Sinaloa in Mexico down to Salta in Argentina along the eastern foothills of the Andes. It is also present in most of the Caribbean including Cuba; in Colombia three populations of it have been reported from the northern slopes of the Sierra Nevada de Santa Marta, in the department of Magdalena (8).

We report here about a new finding of wild lima bean for Colombia, the electrophoretic pattern of its total crude seed storage proteins, and the possible significance of such a material for the evolution of this crop.

RESULTS and DISCUSSION

One of us (OT) disclosed in February 1992 a new population of wild lima bean in Guateque, Boyacá, N-E of Bogotá, at 1,600 masl (73.31W, 5.00N), morphologically close to the wild forms from Ecuador (namely the larger flowers with dark purple standard and violet wings). Its 100-seed weight (16.8 g) falls within the range of the Andean wild lima beans (12.0-20.0 g). The one-dimensional SDS-PAGE analysis of the total seed storage proteins has revealed that all seeds analyzed from this population of Guateque display the so-called Mesoamerican pattern M1. *P. rosei* (DGD et al.-2863) collected at the type locality (Huigra, Ecuador) shows a pattern close to the Andean wild lima beans. *P. augusti* (DGD et al.-2869) from Loja, Ecuador, displays a pattern close to Mesoamerican wild lima beans.

These results elicit several questions. First, it seems that a wild lima bean morphologically similar to the form present in western Ecuador and northwestern Peru (Andean morphotype) extends northwards into Colombia, in interandean valleys this time on the eastern slopes of the Andes (first record for this country to our knowledge). This is rather surprising as previous explorations in southern Colombia (Nariño, Putumayo, Cauca, Huila, Valle, Tolima) in 1985 and 1990 did not disclose any wild lima bean but a wealth of landraces. Second, electrophoretic patterns usually displayed by Mesoamerican wild forms such as M1 are present in wild forms of the Andes with Andean morphotype. 'Mesoamerican' patterns have been reported in wild lima beans in South America (M1 in Magdalena, Colombia, M5 in eastern Junín, Peru, and M1 in Chaco, Argentina), but all of them with an 'Mesoamerican' morphotype (4,8). One can wonder how 'Mesoamerican' electrophoretic patterns arise in wild lima beans of Boyacá. It might be the indirect result of outcrossing (which may be high in lima bean: 9), with cultivated

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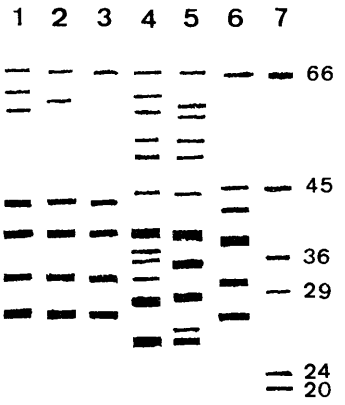

lane 1: DGD-453, *P. lunatus* wild, Mexico
lane 2: OT-141, *P. lunatus* wild, Boyacá
lane 3: OT-141, *P. lunatus* wild, Boyacá
lane 4: DGD-2879, *P. lunatus* wild, Ecuador
lane 5: DGD-2863, *P. rosei*, Ecuador
lane 6: DGD-2869, *P. augusti*, Ecuador
lane 7: molecular weight, in kD

types with 'Mesoamerican' patterns. No cultivars were observed in the immediate surroundings of the wild population of Guateque; on the other hand, the cultivars disclosed so far in Cundinamarca were large-seeded 'Big Limas' (with likely Andean patterns). Ancient instead of recent introgression is possible, but small-seeded lima beans (with likely Mesoamerican patterns) would not grow well at higher altitudes. Another possibility would be introgression from *P. augusti*, but this species morphologically close to the Andean wild form of *P. lunatus* (although with hypogeal germination) has not been found so far in Colombia. A third possibility would be that the two groups of electrophoretic patterns are indeed present in the Andean wild lima beans as expression of their natural variability, in contrast with the small-seeded wild lima beans predominantly distributed in Mesoamerica which display only 'Mesoamerican' patterns so far. If so, the higher diversity of the Andean wild form, particularly this one from Boyacá, as expressed by electrophoretic patterns including some 'Mesoamerican' ones, might suggest a primitive nucleus from which other wild forms of lima bean might have evolved, long before domestication. Third, *P. rosei*, morphologically close to the Andean wild lima bean of Ecuador and northern Peru (both with epigeal germination), is likely identical to it and thus a synonym for the wild Andean genepool of *P. lunatus*. Fourth, as mentioned earlier (3), there might be no strict (genetic linkage) correlation between the electrophoretic pattern and some morphological traits such as seed size and seed colour pattern.

Obviously more field collections are needed in Colombia, especially in order to find possible transition materials in zones of Santander and Bolivar towards Santa Marta, and Imbabura on the other hand. But our results indicate that Colombian materials might be key to solve evolutionary problems.

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